DOD STARBASE

ANNUAL REPORT 2001

This report addresses the design, conduct, and effectiveness of the Department of Defense STARBASE Program as required by Title 10 United States Code Section 2193b(g).

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EXECUTIVE SUMMARY

The Department of Defense's STARBASE program serves local community youth and their teachers by providing training and experiential opportunities in mathematics, science, goal setting, and drug demand reduction. Self-esteem building and goal-setting program applications are used to motivate students in goal-setting and team-building skills. Throughout its history, the program has emphasized hands-on activities, often on military bases, with real-world applications through simulations, experiments, and tours of military facilities, and classroom instruction.

The goal of STARBASE is to raise the interest and improve the knowledge and skills of at-risk youth in mathematics, science, and technology. This is accomplished through 25 contact hours of instruction that use mathematics and science and applies them to real-world situations, technological solutions, and problem solving. In addition, the program encourages teachers to apply the materials in follow-up lessons to meet national and local science and mathematics objectives. Partnerships with the community, industry, government, school districts, and the military are created to foster support systems and additional commitments and resources for the program.

Title 10, U.S.C. Section 2193b is the legislated authority of reference for the DOD STARBASE program. It authorizes the establishment of at least 25 academies under the DOD STARBASE program with no more than two DOD funded STARBASE academies per state and requires the submission of an annual report.

During the data collection phase, it was noted that many STARBASE academies have differing fiscal years. While some use the federal fiscal year (1 Oct – 30 Sep), others use the calendar year (1 Jan – 31 Dec) and still others use the school year as the basis for fiscal programming for (e.g. 1 Sept to 30 Jun). For purposes of this study the term "Program Year" (PY) was developed to normalize data for comparative study. PY represents the annual period of time used by individual STARBASE academies for fiscal and operational programming.

Over the eight-year period that DOD has sponsored STARBASE, the program has grown in national prominence and acceptance in 39 academies across the United States. At present, 26 States, Puerto Rico, and the District of Columbia are represented in the program. The desire by additional local communities and military installations for entry into this highly accepted DOD outreach program is constant. In addition, several academies are requesting expansion of their programs to new communities. While demand is intense, attention over this past year focused on building efficiencies and standardization in operation, monitoring compliance, quality control, resource sharing, installation support, and strengthening the assessment process. Many of these initiatives were guided by the introduction of a new DOD Instruction (DODI) to help ensure that the original intent of the DOD sponsors would be complied with in future STARBASE operations.[1] *To further reinforce standardization and compliance goals, DOD introduced an*

[1] Department of Defense Instruction 1025.7, September 2000. These directives, to be referred to in the report as DODI, instructed the STARBASE Academies on policy, responsibilities and procedures for executing the STARBASE program.

installation program to help expedite the rapid start and operation of new program academies and to assist the program in ensuring regulatory adherence to DODI guidelines.

The impact on the military community this year was very positive in that community relations were heightened; partnerships with community leaders were developed, and the attitudes of and students, teachers, and parents were enhanced.

Managing growth requires careful attention to operational and administrative considerations. Regulatory and compliance applications were put into place to realize quality control, standardization on key activities, and equity in resource distribution. These objectives were manageable by most of the academies this program year. Initial audits performed by the assessment team indicated that a few academies required minor adjustments for corrective action. Only one academy required more extensive curriculum and delivery adjustments.

The new DODI also focused on key core program elements that established baseline measurements for national program performance and operational modalities. By establishing basic standards in operational modes, as well as in the core curriculum, the academies can offer an identifiable product to their constituents in a manageable delivery system that can be empirically assessed across the national DOD STARBASE program. The DOD program has taken significant steps towards complying with the original intent of the program initiators and stakeholders, as demonstrated by the academies' response to the instruction. With the continued improvement in the standardization and compliance process, program planning and development strategies can be implemented equitably across DOD STARBASE academies.

With the release of the DODI, academies have focused on compliance with key core program elements and are well on the way to providing reliable and valid information that yields accurate program operation modalities. As the process continues, information received from compliance efforts will be used to develop future program goals.

Several new initiatives that support regulatory and compliance applications were introduced into the program this past year. These initiatives included the establishment of a core curriculum, new academy installation materials, operational manuals, a resource center network, training and orientation visits for new academies, compliance audits, an Academy Director's Conference, and 13 new academies. Refinements and full installation of the initiatives will continue into the next program year.

While the DOD STARBASE program has grown significantly over the past year, it has also a focus on providing a national program that is consistent in its mission, objectives, and operation. The availability of federal funding for the program resulted in a heightened level of accountability to program guidelines, which are set forth in the DODI.

The program's legislated goals are to provide a military environment in which local community youth, especially the disadvantaged, are provided training and hands-on experiential opportunities to learn and apply mathematics, science, teamwork, technology and life skills. Strategically, its objective is to raise the interest and skills of at-risk youth in mathematics,

science, technology, and good citizenship. Future career and life choices will be enhanced with the ability to apply math and science knowledge to problem solving.

The documentation that reveals the nation's shortfalls in mathematics and science and the effects that these shortfalls have on the economy, quality of education, and national security is dramatic. National education statistics point out that our youth begin to show a sharp decline in academic performance in mathematics and science after the fourth grade.

Although the program is legislated to cover grades K thru 12, the major focus of the program is on the 4th - 6th grades. It is at these grade levels that U.S. students enjoy a highly competitive position internationally. That competitiveness, however rapidly declines in subsequent years[2].

The PY 2001 program has grown to 39 STARBASE academies. Thirteen of the 39 STARBASE academies were funded at the beginning of PY 2001. Although funding was provided for these new STARBASE academies to start operating at the beginning of the fiscal year, that did not occur. The new STARBASE academies are in various stages of development and operation. As of the end of PY 2001, nine of the new academies are fully staffed and serving students. The remaining four academies are in various stages of recruiting and processing staff. The staggered starts resulted in these academies fulfilling a fraction of the performance requirements for STARBASE during the initial year of operation. This had the effect of increasing per unit costs. A focused and standardized academy implementation strategy is being developed to increase the efficiency and effectiveness of the start-up process.

The following statements describe the DOD STARBASE growth, student composition, and operational focus:

- *Since its inception, DOD STARBASE has graduated approximately 219,000 students. If you add supplemental summer and vacation programs, it has reached well over 240,000 students.*

- *More than 38,500 students graduated in PY 2001. This number increased to more than 60,000 when supplemental programs were added.*

- *The number of classes increased from 1,154 in PY 2000 to almost 1,600 in PY 2001.*

- *Class size stayed within the mid-20s range for most academies; some school systems have suffered budget cuts, placing increased pressure on some academies to apply for a waiver to raise class size. Facility size and equipment at some STARBASE locations has limited these exceptions, but pressure is expected to continue.*

- *All currently operating programs offer a 5th grade program, and more than 70% offer classes in 4th through 6th grades. A few academies have developed special programs for other grade levels.*

[2] Before It's Too Late: A report to the Nation from the National Commission on Mathematics and Science Teaching for the 21st Century, Department of Education 2000.

The DOD STARBASE program student population reflects a great deal of diversity in ethnicity and community location:

- *Caucasians and African Americans had the largest gains in numbers and percentages this year when compared to last year, increasing from 3,400 to 18,000 and from 3,000 to 8,500 respectively. Hispanics and other ethnic groups remained relatively the same in number, but lost proportionality in percentage of the total population (e.g. Hispanics dropped from 45% to a little over 11% over the last year). Caucasians are now 54.5% of total student population and African-Americans almost 25%. The dramatic change in these distributions is accounted for primarily in the installation of several new academies that served different ethnic groups.*

- *Last year Puerto Rico had a three to two ratio of males to females; this year the gap was closed to almost equal distribution.*

- *The gender gap, overall, was almost closed. Males account for 51.3% of the population and females 48.7%.*

- *Approximately 35% of the academies reach students within a 20-mile radius. An additional 40% of the academies serve populations who live between 20 and 50 miles from their military base.*

Academy visitations, document reviews, surveys, interviews, director conference proceedings, and testing provided the basis for the following observations and findings:

- *Military commanders indicate that STARBASE provides a positive impact for their military base that increases community relations and provides many of their personnel with the opportunity to volunteer their time to the program.*

- *Directors continually stress the positive support they obtain from military commanders and school representatives.*

- *Most of the Academies used local pre/post testing to quantify student performance attitudes and/or perceptions. For the most part, these tests were designed and administered by academy staff or a local college/university. Over the past three to four years, test results show an average increase of more than 38% per year. Most of the academies still apply their own tests, as DOD is developing and field testing a national standardized test.*

- *Each academy has developed a wide array of curriculum material to take advantage of the unique resources offered by their military locales, which include simulations, hands-on experiments, distance learning, tours, and expert presenters. The innovation of the staff in developing materials and delivery systems has led to an impressive inventory of educational materials. Most academies are willing to share materials and often give them to their sister academies. Depositing inventories of educational material into a central resource center would benefit the program by maximizing the delivery of materials and providing greater*

choices of materials for all the academies. Development of a central repository is currently underway.

- *The unique learning experiences in robotics, submarines, and space exploration available at many of the academies across the nation challenge the ability of STARBASE staff to balance classroom instruction time with core curriculum, testing requirements, and local capabilities. Time management of classroom instruction is considered one of the major challenges of the program.*

- *Sharing of materials across academies, assisting new academies in installation, resource center applications, packaged curriculum, and operational manuals all lower costs of operation and help to build a network and "community" identity for the STARBASE program.*

- *Support services by the local military base and community partnerships vary in type and breadth at each of the academies. This affects the quality and sophistication of each program.*

- *Staff attrition rates remain relatively low. The staffs are enthusiastic and committed to the belief that the program makes a positive difference to the children. The instructors must have teaching experience and credentials. While turnover is low, directors remain concerned about retention of staff in the future.*

- *Employee staffing protocols differ from academies-to-academies. Some are federal employees while others are state or contractor hires.*

- *The prototype STARBASE staffing composition remains relatively stable: one Director, one Deputy Director/Instructor, one Instructor, and one Office Manager. Minor variances in staffing apply when additional funds add instructor/aide capability.*

- *Some academies have problems with reaching students in remote areas. Several programs have started to use distance-learning applications such as compressed video and teleconferencing to solve the problem.*

- *Directors indicate that their major challenges are managing the high demand for expansion, covering the breadth of program material, and controlling scheduling problems introduced by the school systems.*

- *Most all academies offer supplemental programs during the summer, after school, and during school vacations. Several are expanding their outreach and distance learning applications.*

The following initiatives were taken by OASD/RA staff in response to the recommendations presented in last year's report:

- *A standardized assessment and testing application was designed, field-tested, and applied in this year's program (e.g. standardized tests on core curriculum, teacher perceptions, academy performance, and regulatory compliance).*

- *A core curriculum was designed, developed, and distributed to the academies. This will assist in covering essential content material and provide the basis for standardized testing and ease of portability and installation of new curriculum at new academies.*

- *A director's conference was conducted in Washington, D.C. on December 10-11, 2001. Common issues, program/practices, protocols, testing, and new initiatives were shared among the attendees and were the greatest value of the conference, particularly by new site directors. The conference was attended by 90% of the directors.*

- *A web site and formation of a centralized resource center was established. Director's manuals, DODI guidelines, and other documents were distributed throughout the system.*

- *A "STARBASE In a Box" or academy installation package was developed and will be used by an installation team in assisting new academy start-ups.*

- *A site visitation team audited several academies on compliance with DODI requirements concerning basic operating policies and practices. Most of the academies were in compliance although a few required minor corrective action.*

- *Consensus of the feedback received on orientation and training at new academies indicated that the optimum time for orientation was at the beginning of academy start-up, after personnel selection and before classes start. The focus on compliance issues, best practices, and staff concerns provided a clear understanding of DOD STARBASE expectations at the outset. Provisions of training, references, and resources from the national office bolstered confidence of new staff members. Feedback from directors and staff members concerning visitations was positive.*

Program Costs for DOD STARBASE Operation:

- *The average cost per unit of the program has leveled off over the past four years. The average cost of an academy over the seven-year period is $245,000 per year, while the average cost of an academy over the past four years is $235,000 per year. This year the average cost is $237,685.*

- *The cost per student during the first seven years averaged $197 per student; this year it is $246.60 per student. Cost per class this year is approximately $6,000.*

- *DOD is the major source of funding for STARBASE. Less than $900,000, or approximately 9.6% of the STARBASE academy's budget, is obtained from outside sources such as grants,*

donations, or trusts. Funds from other sources are concentrated in a few academies. These amounts vary from year to year and are used to obtain additional staff or equipment.

- *Funding from outside sources and the variance in military support services continue to produce some inequities in the quality of program operations nationwide. To help balance this, some support services are centralized (e.g. resource center distribution of material, installation assistance, and curriculum development).*

- *Overall, DOD funding for STARBASE academies increased from approximately $6 million in PY 2000 to $10 million in PY 2001. Most of this increase was allocated to cover the cost of 13 additional academies this program year.*

- *DOD published a set of regulations and guidelines last year to obtain consistency and standardization of program operations, policy, procedures, and core curriculum. The regulations focused on class size, participant eligibility, student contact hours, military base program delivery, and several administrative and operational procedures.*

DOD's National Standardized Test and Assessment indicated that:

- *Students enter the program with high expectations. In addition, "Military people do lots of different things" and "Military bases are cool" scored quite high.*

- *Boys offer more positive responses regarding the military while girls express more positive responses to interpersonal items.*

- *The teacher survey indicated that students enrolled in the program are more interested in learning about science and math and have improved their understanding more than those students who are not exposed to the program.*

- *The student knowledge assessment showed an increase in knowledge and application of key DOD STARBASE programs.*

- *Teachers from the participant schools have positive attitudes about the effectiveness of DOD STARBASE.*

- *Students have positive attitudes regarding innovation and developing new things.*

- *Student knowledge of concepts that were unknown before the program increase significantly after the program.*

- *Teachers indicated that students share their DOD STARBASE experiences with others and remember them long after the program has ended.*

- *Teachers have also indicated that students have improved pro-social attitudes after STARBASE participation.*

- *They also indicated that DOD STARBASE instructors are good role models and are admired by the students.*

- *Teachers use the DOD STARBASE materials in their own classes and would like more materials.*

- *High in the ranking of teacher attitudes was their belief that the DOD STARBASE curriculum supported the state standards.*

- *Principals were strong supporters of the DOD STARBASE program.*

Academy visitations were conducted by an assessment team for the purpose of auditing adherence to compliance guidelines. The following observations were made:

- *Most of the academies were in full compliance.*

- *A few academies required minor adjustments to be considered in full compliance within the program year.*

- *One academy required attention to curriculum coverage, student hours and testing, military installation delivery, and participant selection.*

- *There was general acceptance among the academies on the DODI, with few objecting to its application or objectives.*

- *The classroom coverage and emphasis on core curriculum proved difficult for several academies. Several suggested greater specificity concerning learning and content objectives since the DOD standardized test is applied to cover this material.*

The following recommendations were generated from several sources: the assessment process, site visitations, the director's conference, and the DOD STARBASE staff:

- *Expand the assessment survey and the site visitation audits to include academy budget management and invoicing. Conduct simple reviews to ensure that DOD-only books are kept to review fund usage. While no problems have emerged as of this date, the program is growing, and DOD STARBASE staff is co-mingled with other youth programs. The potential also exists for co-mingling of funds between youth programs offered at local academies*

- *Develop recommendations and guidance on how directors and DOD STARBASE staff can use assessment and test data in their program operations and materials development.*

- *Design a bulletin board capability on the web site for sharing information, scheduling, and other useful information between the OASD/RA, contracting support, and the academies.*

- *Continue the director's conference. Expand the agenda to exploit the sharing of information, lessons-learned, and new initiatives. Directors should be canvassed prior to the organization of the conference – an advisory group may be helpful.*

- *Review and assess the information and communication requirements of the academies and the support groups with a view towards improving the timeliness, usefulness, and reliability of the information between the groups.*

- *Incorporate the results into the resource center inventory.*

- *Implement an academy installation team to assist new academies in their "start-up". "STARBASE In a Box", along with training, would help to speed up the operation of the program.*

- *Expand the resource center applications to include survey data requirements, installation materials, an electronic bulletin board, test administration, operational considerations, and curriculum materials.*

- *Monitor staff turnover and retention on a quarterly basis and assess its impact on program delivery.*

In summary, STARBASE continues to enjoy a great deal of popularity and support among its military sponsors, clients, and communities. Its growth is rapid; it is spanning the nation and fulfilling its mission in a variety of communities. It does not require any formal marketing since demand is high and the program is self-promoting through its clients. Maintaining quality control and standardization in operations along with managing growth demand and costs are the new challenges.

OASD/RA's initial efforts at fulfilling its continuing responsibility to monitor compliance with the DODI include performing the first six compliance audits of STARBASE academies and surveying directors for key information regarding STARBASE operations at their location. These initial efforts have revealed that the program as a whole demonstrates a degree of effectiveness in the areas of community outreach; raises the interest and knowledge of youth at risk in math, science, and technology; and exposes youth at risk to technological environments and positive role models found on military installations. However, the program's current degree of effectiveness falls short of the program's potential degree of effectiveness, which will be realized when all academies are in strict compliance with the DODI and operational efficiencies are improved.

Recommendations are now focused on supporting compliance objectives and building support systems to assist academies in meeting standardization and efficiency objectives. Enthusiasm and acceptance is high. This is expected to continue and be a key factor in maintaining a positive and successful program next year.

INTRODUCTION

This is the eighth year of the STARBASE program's operation. After a demonstration year under a grant from the Kellogg Foundation, DOD has supported the program for seven years. This year's annual report describes a program that started modestly at a few military bases with local community sponsorship to provide training and experiential opportunities in mathematics, science, goal setting, and drug demand reduction to youth. Over the past several years, the program has rapidly grown in national prominence and acceptance. The FY 2000 National Defense Authorization Act provided legislative authority under 10 USC 2193(b) and the program currently has 39 sites spanning 26 states, Puerto Rico, and the District of Columbia. Many local communities and several commanders have shown serious interest in having the program at their locations.

There is a demand by current operating academies to expand their operation to additional communities. This demand is multifaceted; local communities, educational systems, military personnel, and community leaders see its value in reaching several desirable goals. The primary goals of DOD community outreach, and increased interest and knowledge in math and science may be furthered by using non-traditional methods. Within this recognized need and demand is DOD STARBASE's greatest challenge: how to respond to the demand for growth in a timely, cost-effective, and empirically validated manner. The design, conduct and effectiveness are the overarching themes of this report. This report covers the growth of DOD STARBASE, compliance auditing, curriculum development, standardized testing and assessment, transportability to additional academies, community acceptance/responsiveness, and cost of operations.

As with any program that demonstrates rapid growth, STARBASE faces many challenges. Some of these involve:

- developing and installing a standardized core curriculum across all academies while incorporating the variable experiences that the local resources and capabilities of the STARBASES' military facilities provide to a coherent curriculum;
- covering the breadth of the curriculum within limited class hour availability;
- developing a standardized testing/assessment system across all program academies;
- responding to local demand for expansion to additional students and communities;
- maintaining community and command support in rapidly changing environments;
- attracting and retaining quality personnel; and
- focusing on balancing growth demands versus quality control issues.

These are but a few of the challenges addressed in this report. Several of these challenges were addressed in the DODI issued last program year to ensure program standards and maintain the

integrity of the DOD design intent. In addition, STARBASE has proven to be innovative in developing solutions and plans of action to meet several of these challenges.

In last year's report, a number of recommendations were presented for this year's operation. The purpose of the recommendations was to maximize the program's overall ability to provide a standardized quality product and contribute to the effective use of resources in fulfilling the original intent of the DOD STARBASE program. The progress and status on each of those recommendations is addressed.

The strengths of the program are obvious and cannot be overstated. Military personnel, students, educators, community leaders, and staff are deeply committed and energized by the program. Students respond positively to the content of the course material and their attitudes and performance in math and science radically shift to the positive. Military-community relations are enhanced. The costs of operation per student are low and continue to decline. New academies are rapidly installed and operational. Each academy assists the other in lesson selection and materials. Most of the academies meet the DODI compliance guidelines, and most have developed materials and exercises that have proved to be both creative and supportive of core curriculum objectives. These characteristics will become quite evident in the report's presentation.

There are several concerns and issues in program operations that have emerged in selected areas as well as support activities that would assist in building future efficiencies. These observations and considerations are discussed throughout the report.

In addition to documenting the annual progress and assessment criteria of the program, a set of observations and recommended actions are presented at the end of the report for future consideration.

DOD REQUIREMENTS AND COMPLIANCE

Last year, the Office of the Assistant Secretary of Defense for Reserve Affairs published a set of instructions and guidelines for regulating the STARBASE program. The purpose of these instructions and guidelines is to obtain consistency of program objectives, policy, and procedures in realizing DOD goals and objectives. Given that many of the academies started their operations without guidance on policy and procedures in the earliest stages of development, a number of differences in program activity emerged across each of the academies. While the academies share the same mission and curriculum content, diversity in emphasis, operational procedure, and program delivery started to emerge. While the similarities across STARBASE academies are certainly greater than the differences, each academy is encouraged to take advantage of local resources and capabilities available on the military bases. Given that the amount of classroom time was limited, many of the academies developed very unique and innovative curriculum. Differences started to arise and affect the time devoted to core curriculum, operational procedures, the number of the classroom hours, and classroom size. Some of these differences had a negative effect on transportability of best practices, curriculum development, assessment procedures, and administrative protocols. Thus, the program focuses on those elements that could injure the key practices and procedures of the core program, but still maintains and takes advantage of the strengths and diversity of the resources found on the local military bases.

The DODI focus on increasing standardization across the academies in class size, participant eligibility, core curriculum, program location on military installations, and several other administrative and operational procedures. These instructions were sent to each academy for self-compliance and review as the first step in the regulatory process. In addition, any exceptions, temporary or permanent, were to be written for consideration to the DOD with the expectation that compliance would be achieved through a scheduled plan of action designed by the academy and approved by DOD. Academy visitations by the DOD assessment team used the new regulation as the basis for compliance. The academy visitations, as of this report period, indicated that most of the DOD STARBASE programs were in full compliance with the DODI. A few academies required minor adjustments, which could be obtained within the program year. Only one program required a major restructuring of its delivery system, core curriculum, testing, and use of the military installation for classroom instruction. This program has been tasked to develop and submit a plan of action to reach compliance in a scheduled period of time or otherwise lose funding. Most of the visitations in the first phase focused on the older fully operational academies. Differences in operation were expected, yet the differences were not as prevalent or dramatic as anticipated. Most of the academies that were visited felt that the DODI was reasonable and manageable.

During the academy visits, particular attention was paid to the use of the core curriculum and its linkage with the assessment process. We found that most of the programs struggle with coverage of the curriculum within the allotted time period that instructors have with students. We also focused on the content emphasis of the core material. This is important because standardized tests focus on the core curriculum. If the emphasis and its coverage is obtained in the classroom, then the reliability and the validity of the test is enhanced. During this time, the directors and

staff expressed their concern on the time available for administering the national test and their locally developed test.

Compliance with DOD guidance maximizes the national program's overall ability to forecast program results and provide a standardized quality product. It also increases the ability of the program to effectively utilize resources to fulfill the original intent of the DOD STARBASE program. Future academy visitations will focus on budget management, core curriculum adherence, testing procedures, and report schedule requirements.

Mission

The goal of the DOD STARBASE Program is to raise the interest and improve the knowledge and skills of at-risk youth in math, science, and technology by exposing them to technological environments and positive role models found on military bases and installations. Any school district (public or private), alternative educational provider, or individual or group of home schooling families may apply to participate in the DOD STARBASE program.

DOD STARBASE academies, in coordination with local school administrators or other alternative education providers, actively encourage participation by all youth, including:

- ✓ youth-at-risk who are historically under-represented in science, math, and technology fields;
- ✓ youth who live in inner cities and/or rural locations;
- ✓ youth with disabilities;
- ✓ youth who have socio-economic disadvantages; and
- ✓ youth with low academic performance.

Program Description

DOD STARBASE academies, on average, delivered approximately 41 classes per academy this year as opposed to 60 classes last year. The 13 new STARBASES this year account for the lower number. Because of local school administrative and personnel processes, four DOD STARBASES did not process any classes during the reporting period, although they are funded with PY 2001 funds. Their energies focused on staffing, training their instructors, facilities management, and preparation activities. The PY 2001 funds are obligated to procure staff, facility furnishings, supplies, equipment, facility maintenance, utilities, and real property upgrades to support academy start-up. The nine other new DOD STARBASE academies have low participation numbers because several of them are just beginning to process students. In addition, reporting procedures and criteria defining DOD STARBASE classes were changed so that classes reported this year were limited to those that met the newly published DODI specified criteria. The adherence to the stricter reporting protocol significantly lowered the reported number of classes. The numbers from the new academies are included in the average. The overall range runs from single digits to hundreds of classes per academy depending on the instructional formats offered by the specific academy and the length of time an academy has been in operation. Under the new DODI 1025.7 guidelines, the minimum number of classroom

hours per academy is 700 per year. Most of the academies currently operate above that level. The most frequently used instructional formats are:

- Providing 20 classroom contact hours of instruction spread over four days.
- Providing 25 classroom contact hours of instruction spread over five days.

Off-Site and Specialized Programs

Because of the tremendous demand and large service areas of the DOD STARBASE academies, several locations have implemented an off-site program. These off-site programs are administered in public schools using the DOD STARBASE curriculum; some of the off-site programs are funded by sources other than DOD. Variations in the program currently include:

- Teachers are trained by DOD STARBASE staff to administer the program in the school using the same curriculum and resources as the DOD STARBASE. The DOD STARBASE program exercises and supplies are put in a kit and sent to off-site participating school.
- Three eight-hour days of DOD STARBASE instruction are performed at the public school.
- Five half-days between two classes with a one-day visit to the Military Installation.
- DOD STARBASE Compressed Video Television is delivered to the off-site participating schools.

These programs, though noteworthy, do not meet the requirements of DODI guidelines to count towards 700 hours minimum per year of classroom contact. They have, however, grown out of DOD STARBASES' basic program design.

DOD STARBASE academies offer additional periods of special instruction, including summer school (non-academic year) sessions, one-day workshops, community outreach, and teacher training periods. The DOD STARBASE teacher-training curriculum is a fully accredited course at the local college for several DOD STARBASE academies.

DOD STARBASE academies provide a unique, hands-on learning experience that stresses student involvement. This hands-on and inquiry-based approach builds on the ability of students to explore, experiment, and discover and to develop and apply their knowledge and skills. The DOD STARBASE approach connects math and science to everyday, real-world situations.

Participant Eligibility and Grade Level Concentration

DOD STARBASE has traditionally and purposely targeted students who are most in need of the program's ability to upgrade their skills in math and science. This is accomplished by soliciting participant schools that are located in areas that reach the populations with the desired demographics. Some factors taken into consideration are participants who reflect low socio-economic status, single parent households, and populations who qualify for the reduced school

lunch program. The academies actively seek out and focus on these and other factors in their selection of participant school systems.

DOD STARBASE focuses on grades four through six. Schools transport classes from the targeted area to the military base for program instruction. The majority of student attendees fall within the targeted and desired population.

Organizational Structure

The DOD STARBASE academies operate their programs on Active, Guard, and Reserve military installations. The oversight responsibility of the program resides in the Office of the Assistant Secretary of Defense for Reserve Affairs. This office approves the DOD components' plans for implementing each academy's program by managing the funding allocation process, developing and implementing the regulatory guidelines of the program, monitoring each program's compliance and performance, assessing their effectiveness, overseeing the development and production of the Annual Report, and providing administrative oversight as deemed necessary.

The DOD components implement the DOD STARBASE programs by providing facilities, personnel support, and adherence to the DODI, testing and reporting activities, and sources of operational support. Each academy usually develops an advisory board that assists the academy in community relations, funding, and grant initiations. Most academies have extensive military and civilian volunteers who serve in several support activities such as teacher/instructor aides, tour guides, monitors, and assistants to special projects.

Some of the academies have "not-for-profit" organizational relationships and often are composed of military, civil, corporate, and educational leaders of the community. They may be part of the board, or the board itself, and perform key functions such as fundraising, public relations, dissemination initiatives, and expanding and enhancing partnerships in the business and educational community. Some are closely involved in the daily operations of the program while others serve in a more advisory function.

Program History

In less than a decade, the DOD STARBASE program has grown into a national program that currently operates and maintains 39 academies in 26 States, Puerto Rico, and the District of Columbia. The DOD STARBASE program began when there were few prospects of remedial action available in the existing educational systems. The deficiencies and shortfalls in math and science became more pronounced as the National Educational Report Card (1991) documented at the start of the last decade. The program started when Barbara Kosack, a Michigan elementary school teacher and a current DOD STARBASE director, the Commander of Selfridge Air National Guard Base, Brigadier General David Arenote, and a National Guard F-16 pilot Richard Racosky submitted a grant application to the Kellogg Foundation to develop and test the efficacy of a program that they named the STARS program.

The original STARS program was a one-week summer program in partnership with local schools that contained many of the basic concepts and curriculum approaches that presently operate in today's DOD STARBASE. STARS focused on the 4th, 5th, and 6th grade students. The response and interest in the program was exceptionally positive and with a desire to build on this relationship between the military and local educational systems around the country, the interest grew to other academies. In 1994, DOD funds were made available for the Air National Guard to start a school year program, and DOD STARBASE was formally launched.

The demand and popularity of the program has grown tremendously as a result of effective military outreach that demonstrated the ability to increase the interest and knowledge of our nation's youth in math and science.

Program Goals

This year the DOD STARBASE program has focused on its ability nationally to meet stated program objectives. Local DOD STARBASE directors have, in the past, operated with almost complete autonomy over program curriculum, operations, and assessment strategies. This led to a program that basically shared the same name, yet the components of the program at the local level had very significant variances.

Variances in such areas as targeted audience, delivery strategy, participant selection procedures, and testing resulted in a national program with little consistency and commonality. There existed no single strategy that was common among all of the DOD STARBASE academies to assess corporate achievement of the program nationally. For the first time, last year's report initiated a strategy to measure national achievement of the program in the area of change in attitude of the DOD STARBASE students toward math and science. A single survey instrument was designed and distributed to all the DOD STARBASE academies to use to gather data on student pre-and post-DOD STARBASE attitudes. We learned from this experience that a huge variance existed in the effectiveness of the program from academy to academy. This was further confirmed by the six compliance audits that were performed at academies representative of the various service components.

The levels of variability made it difficult to isolate and measure national program objectives. The small clusters of academies that shared the same leadership, for example the Navy academies, demonstrated much smaller variances than throughout the various sites at large. This is largely based on the program consistency that is orchestrated from shared and involved leadership.

SITE ADMINISTERED TESTING

Prior to DOD's development of a DOD STARBASE-wide testing and assessment program, most of the academies developed and administered their own local knowledge tests. The tests were designed to evaluate the effectiveness of the core curriculum and the material that reflected their individualized program. Most of the tests were staff developed. A few programs obtained assistance from local universities and colleges. These tests were refined and enhanced over the years to reflect changes in curriculum content and emphasis. Most used a pre-and post-test format. The measures primarily focused on math, science, social, and personal achievement skills. Many of the academies shared their testing items with other academies, but for the most part, each academy had its own testing program. As DOD introduced the DOD STARBASE-wide standardized test, most of the academies continued to use their own testing program along with DOD's assessment instruments. This will probably continue into next year's program.

As the following chart illustrates, the site administrated pre/post tests demonstrated a significant increase in the scores across the DOD STARBASE program. Over the past three to four years, the rate of increase, on average, is more than 38%. While the local tests are not the same for all DOD STARBASE academies, the academies are required to teach the same core curriculum. Figure 1 reflects the average rate of increase in academies pre/post scores across all academies.

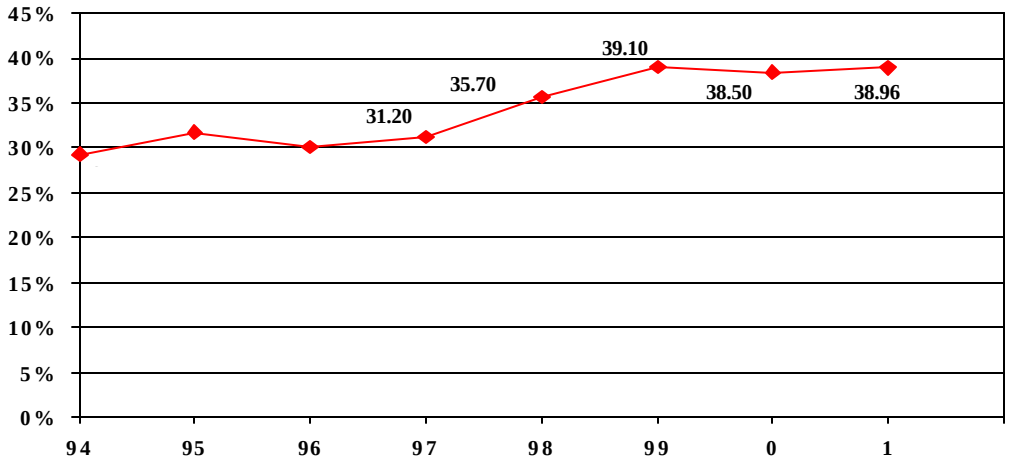


Figure 1. Rate of Increase of Academy Administered Pre and Post Assessment Tests

The DOD STARBASE test and assessment program is presented in the next section of this report. The DOD standardized test, unlike the local academy tests, applies the same test items on the standard core curriculum to all DOD STARBASE academies. The standardization of the test and its administration allows for greater comparability of test results and assessment of the national program's overall effectiveness.

National testing showed an average increase in knowledge of 12.4% while local site administered testing showed an average increase of 38%. While both are positive, the former is nationally defensible. The wide difference in scores is based on the following:

- Local academy testing is designed to measure the effectiveness of the local curriculum; the national assessment is designed to measure the effectiveness of the mandatory standardized curriculum throughout the program.

- Significant differences exist between DOD STARBASE academies, on how they present the required core curriculum to DOD STARBASE participants. The national assessment is a standardized testing protocol that addresses the required core curriculum and is indifferent to the diversity that is introduced in localized curriculum.

- Local tests also address local learning objectives that are outside of the scope of the mandated core curriculum. This discretionary area is not addressed on the national assessment.

DOD STARBASE STUDENT AND TEACHER ASSESSMENT

A key objective of the DOD over the past few years was to develop a single DOD STARBASE - wide standardized student and teacher assessment tool that would measure the change in the knowledge, skills, and attitudes of the client population after participation in the DOD STARBASE program. A qualified independent firm was commissioned to design the assessment instruments that would stand the scrutiny of assessment experts. The assessment process is in its second year of development and refinement. Initial results indicate positive gains in knowledge, attitude, and overall DOD STARBASE effectiveness.

The assessment process was implemented to learn about attitudinal and knowledge shifts that correspond with participation in DOD STARBASE. The survey process from last year was expanded to include a knowledge assessment. The sponsors of the survey were primarily interested in:

- Knowledge surrounding a core curriculum.
- Attitudes towards math, science, and technology.
- Attitudes towards military/military personnel/military locations/military careers.
- Community awareness, citizenship, and other pro-social attitudes.
- DOD STARBASE effectiveness.
- DOD STARBASE impact.

The student and teacher surveys from last year were refined and a knowledge test was added to the student assessment. A pre-and post-program assessment of DOD STARBASE students offers the greatest probability of tracking attitudinal and knowledge shifts. Unfortunately, time constraints prohibited collecting this information the first day and last day of participation from the same students. After careful consideration, the researchers decided to administer pre-and post-program questionnaires to students on the first and last days of participation of the same course, but not always with the same students. The teacher survey was refined and focused on collecting information regarding the impact of the program in the classroom and teacher attitudes toward DOD STARBASE. Future applications will focus on applying the tests on the first and last days of participation.

Instrument Design

Improvements for the surveys were based on an analysis of the student and teacher surveys administered last year. A panel of researchers adjusted the old items and constructed new questionnaire items. New questions were based on program sponsor requests and responses evaluated from the prior student survey, which revealed that the students had no problems with a seven-point rating scale. Therefore, the seven-point scale was used again this year.

Items for the knowledge portion of the student assessment were developed using the standard core curriculum as a guide. Knowledge and opinion items were based on the sponsors' interests listed above, a review of program curricula, responses to last year's survey, and a review of testimonials and tests currently in use at several DOD STARBASE programs. The knowledge tests already in use in DOD STARBASE programs were examined for style and content. Some

of these items were included in the piloted instruments. Other items were pulled from DOD STARBASE worksheets. The remaining questions were newly created items that were consistent in style and readability. The test provided administrator instructions for the assessment coordinator and the DOD STARBASE instructors. The instruments were designed to be easy to read for students with limited English reading ability. The instruments also use scan form technology.

Two versions of the knowledge test were originally developed and piloted. The final items were selected from the two versions. Item formats include true/false, multiple choice, and matching to graphic images.

Instrument Design Challenges

Developing a single assessment for a wide range of abilities for 4^{th} - 6^{th} grades presented many challenges. Many students are entering the program with different fundamental knowledge. For example, some students need to learn the concept of gravity, and others come in with that knowledge. Adding to the complexity are different levels of student, special needs, DOD STARBASE funding, and general resources of school districts in communities with different tax bases. The current student assessment was an initial effort to estimate the middle ability level. An analysis of students' performance on this assessment can be used to develop multiple assessments in the future at various ability levels.

Another challenge of developing a single assessment is the difference in curricula across programs. The knowledge items for the current assessment were developed to cover a standard DOD STARBASE curriculum. Key concepts that are common across DOD STARBASE may be taught at varying depths and may use different vocabulary. Identifying key DOD STARBASE concepts and definitions that can be used for developing knowledge tests at various ability levels is critical and is a key objective in core curriculum applications in the future programming year.

STUDENT RESPONSES

Pre-Program Attitudes

Many of the responses were positive for the 1,355 students who completed the survey before participating in the DOD STARBASE program. This suggests that these children entered the program with high expectations. "Military people do lots of different things" and "Military bases are cool" were quite high on the list. These children had just arrived at a military facility and were about to embark on an adventure, courtesy of the military. They appeared to be eager to participate in the program and were open to new experiences.

Post-Program Attitudes

The 1,013 students who completed the survey at the end of participating in the DOD STARBASE program offered the most positive responses concerning pro-social attitudes. They were excited on their last day of the program and appeared to express a positive vision about their futures. They acknowledged that they "learned a lot of things I can use."

Students also had positive attitudes regarding innovation and developing new things. There was relatively greater responding variance with the math and science questions. This was also true on the pre-program survey.

The analysis of data from the standardized national testing used to measure the knowledge of DOD STARBASE students in math, science, and technology revealed that many students came into the program with some knowledge of the concepts taught in DOD STARBASE. This provided a good foundation for building knowledge and comfort. The total knowledge pre/post-test scores indicate a positive test increase from a pre-test mean of 20.26 to post-test mean of 22.78, a 12.4% increase. Knowledge of key concepts that were unknown by participants before attending the program increased significantly after experiencing the DOD STARBASE curriculum. The following items identify areas that significantly increased.

Table 1. Post-Program Knowledge Scores

*Test Item Stems	% Correct	Std. Dev.
Wing	91	28
Cockpit	91	28
If you have something you want to do, or something you want to be in life, you should	89	31
Our solar system consists of how many planets?	82	38
Force that pulls an aircraft down	80	40
Forward movement produced by a propeller, jet, or rocket engine	74	44
Elevator	73	45
Rudder	72	45
Slows the forward movement of an aircraft	71	45
Produced by air flow over the wings and the angle of the wing into the wind	69	46
If you threw two balls of different weight using the same amount of force	67	47
Technology usually increases the size of something	57	50
Air presses down 15 pounds on every inch of our bodies. The reason we don't feel this pressure.	51	50
What is Sir Isaac Newton's Law of Inertia?	49	50
How thick is the Earth's air?	48	50
If you are landing an airplane in a city that is 5,000 feet above sea level what will your altimeter read when you are on the ground?	48	50
The air is composed mostly of what element?	46	50
When you increase speed of the air moving over a wing, the air pressure on that wing	44	50
An atom is the joining of two or more molecules	25	48

*See Appendix B: Pre-Flight and Post-Flight Questionnaire for complete items.

Implications for the Results

This assessment data was gathered in late fall, raising a couple of concerns. Student enthusiasm was generally high at the beginning of the school year. They experienced new teachers, classes, classrooms, classmates and in some instances, a new middle school. This likely inflated the pre-test attitude measures. We are finding that the students begin DOD STARBASE with very high expectations that may be difficult to sustain as the novelty of all aspects of their school life wane. In addition, the window of time for data collection is extremely limited, and only a handful of DOD STARBASE students will be able to take both the pre- and post-test. Our concern is that this brief snapshot in time is not representative of the full range of student experiences. DOD STARBASE might be a more welcome respite from the regular classroom activities later in the

year and may, therefore, be a more memorable experience. Students might be more attentive to the lessons after their classroom teachers have had more time to prepare them for the experience. Right now, the experiences of children at DOD STARBASE between January and September are unknown.

Planned analyses included:

- Pre- versus post-program comparisons.
- Gender comparisons.
- Age and grade level comparisons.
- Item difficulty.
- Identification of program strengths.
- Identification of program developmental needs.
- Discovering drivers of preferred outcomes.

This report presents final results. In many locations, pre-program data comes from a different combination of students than the post-program data. Only large effects and differences can stand out from this level of "noise" variance. There is a large amount of variance in the curricula and the student populations served across locations. Students arrive with different expectations and knowledge and leave with different perceptions and knowledge based on different experiences. These analyses were designed to offer some insights about strengths, needs, and opportunities from the perspective of the consumers of the DOD STARBASE program. The information about drivers can be used immediately to focus efforts on activities that are likely to yield the most impact on preferred outcomes. These analyses may also aid the development of assessments for various ability levels.

National Assessment Summary

Graphs on pre-and post-program means for all the survey items and the 33 knowledge items along with a copy of student and teacher instruments are in appendices A and B respectively. The entire attitude means, both pre and post, are high. Many of the knowledge items display an increase in the percent of students answering correctly after program participation.

DOD STARBASE ACADEMY STAFFING

The composition of each DOD STARBASE academy staff is comparably the same. DOD budget allocations to each academy are based on similar staffing and operational support requirements. However, there are differences in a few academies. In most cases, these are minimal and are obtained when the academy is able to gain additional funding from other sources. Generally, the academies use additional funds to expand instructor capabilities. There are also a few that are short of a full-time instructor because of third party contractor relationships. These differences are described in other sections of the report.

The prototypical academy employs four 4 full-time paid staff members. They include:

- Director
- Deputy Director/Program Instructor
- Program Instructor
- Office Manager

DOD STARBASE is classroom and experience driven, which requires an intensive instructor-based capability. In most cases, the two instructors are assisted by volunteers (military and civilian) and/or teacher aides. The directors often substitute when instructor illness or turnover occurs. There have been a few cases when office managers, who have instructor credentials, have filled in, but this is the exception rather than the rule. Some academies have also developed a certified DOD STARBASE instructor pool of talent. This capability was designed for outreach purposes and is not included in the full-time staff complement. Instructors are generally required to have formal educational degrees, training experience, and math/science experience. Background checks and often fingerprint processing is required. Most academies currently enjoy highly trained, fully credentialled, and experienced personnel who are deeply committed to the DOD STARBASE concept and methodologies. The directors indicate that a major challenge is staff retention. Directors are concerned that STARBASE teacher compensation is not competitive with the compensation packages of teachers in the school system. At present, the academies experience a low turnover rate. Employee affiliate relationships vary from academy to academy. Some are federal government employees while some are state employees, and others are contractors. In all cases, they are required to meet DOD STARBASE guidelines in policy and procedures.

As previously indicated, the staff is often assisted by military and civilian volunteers. Military personnel assist in the classroom by giving briefings, demonstrations, and tours. They provide examples of how they use math, science, and personal skills in work situations, to solve problems. Military personnel have expressed the benefits they have gained by participating in the program (i.e., giving something to the community, student enthusiasm and excitement, and the demonstrated contribution to the goals of the country).

PROGRAM GROWTH

Program growth in the number of classes and student participants continues to escalate. Even with the lack of full installation of the 13 new academies, the number of projected classes for PY 2001 is 1581. Between 1994 and 2001, the number of classes has increased from 517 to 1581. See Table 2 – Number of DOD STARBASE Classes by Year.

Table 2. Number of DOD STARBASE Classes by Year*

Year	1994	1995	1996	1997	1998	1999	2000	2001
Total Classes (All Sites)	517	834	973	1083	1188	1242	1154	1581
Avg. No. of Classes Per Site	37	56	57	64	66	56	44	47
No. of Sites Reporting	14	15	17	17	18	22	26	34

* Average number of classes may vary by year because of start-up installations in early stages of implementation and thus were not in full operation. This also affects the number of academies reporting each year. This does not include supplemental programs, such as one-day workshops, summer sessions, and teacher training seminars

The student population has similarly grown from 15,382 students in PY 1994 to more than 38,000 in PY 2001 with a grand total of more than 219,000 DOD STARBASE graduates during that time period. Adding the number of students in supplemental programs, the overall total for PY 2001 is close to 60,000 students. Because this report is generated in the middle of the school year, portions of the figures are estimates for the year. However, our historical exigencies indicate that these final figures are close to actual projections.

Table 3. DOD STARBASE Student Population by Year*

Year	Number of Academies	Number of Students	Average Number Per Academy
1994	14	15,382	1,098
1995	15	25,597	1,706
1996	17	23,256	1,368
1997	17	24,910	1,465
1998	18	29,615	1,645
1999	22	31,473	1,431
2000	26	30,626	1,178
2001	34	38,554	1,134

* Number of academies will vary according to the number of academies in full operation at the time of reporting.

Class Size and Grade Levels

In accordance with the legislation, all grade levels from K to 12 are eligible for program involvement under DOD STARBASE program objectives. However, the program focuses on the 4th through 6th grades with particular attention to the 5th grade. All currently operating academies have a fifth grade program with the exception of Puerto Rico. Several academies exclusively focus on the 5th grade while a few extend their offerings to several grade levels. Thirteen academies provide classes to four or more grades levels while the majority of the academies limit classes to three grades or less.

While the emphasis is on the middle grade levels, community groups and educators frequently request the expansion of the program to other grade levels. The popularity, acceptance, and strong belief by teachers and educators in its effect on student performance builds a high demand for additional classes and grade openings. We expect that there will be continued pressure to expand the program to other grade levels.

Class size is largely a reflection of DODI guidelines and school system policies. They are generally the same. The academies do their best to select only those schools that meet the desired standard of 20–35 students per class. There are occasions when the limit is expanded.

The academy often finds it difficult to refuse to admit a class from a participant school that has a few more students than the agreed-upon numbers. The academies generally accept the additional students as long as it does not stretch beyond their capacity to effectively accommodate the class. The academies present the DODI guidelines to their participant school systems upon entry to the program. The DOD STARBASE staffs generally consider stretching the number of students beyond the desired number as dysfunctional and counterproductive.

Ethnicity

There was a dramatic shift in the ethnic composition of DOD STARBASE over last year. Caucasians and African-Americans had the largest gain. The Caucasian population displayed a 30% increase. When the two groups are combined 54.4% and 24.5% respectively, they comprise about 80% of the total DOD STARBASE population. The groups with the biggest losses were Hispanics with a net loss of 32% and Asians, with a 2% loss. The other groups remained relatively stable but also were least represented. As new academies are added, the ethnic composition will shift according to the demographics found in those locations. See Figure 2 – Program Ethnicity.

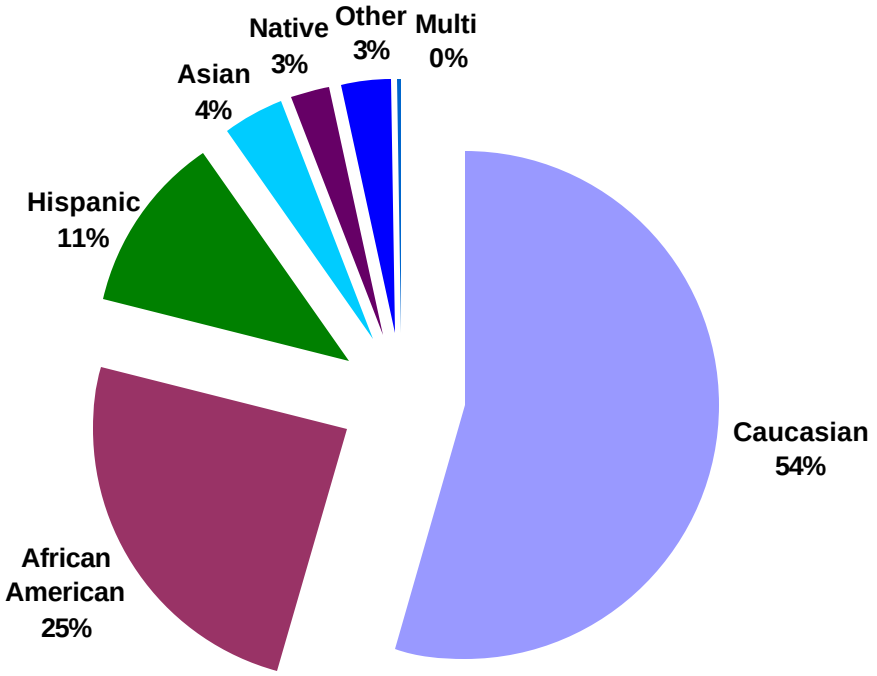


Figure 2. Program Ethnicity

Gender

Last year, the program displayed a relatively equal distribution of males to females with 54% male and 46% female; this year, the equality of the distribution was even closer at 51.3% and 48.7% respectively. In addition, the one academy that displayed an imbalance last year (Puerto Rico with a large male population) displayed an equal distribution of male to female student population. See Figure 3 – Gender Participation.

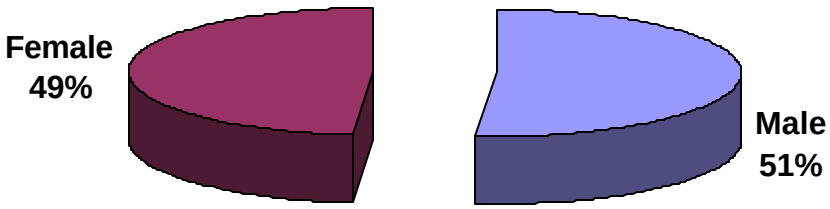


Figure 3. Gender Participation

Program Service Area

Approximately 75% of the DOD STARBASE programs operate within a 50-mile radius of the military installation. The logistical problems of transportation and classroom time requirements push the contingency value to the forefront when the academies meet their participant educational systems. Classroom hours and transportation costs drive the proximity issue in school selection and participant relationship. This observation was further supported by the fact that approximately 35% of the academies service their programs within a 20-mile radius.

The programs that operate in remote areas have a different problem. They often conduct some of their classroom hours in remote field units with periodic trips to the military installation for selected tours and exercises. The tendency for proximal selection of participant schools is driven by practical considerations. The academies that did not conduct classes are not included in Table 4. This accounts for the difference in the number of funded academies (39) and the total number of academies represented (35). See Table 4 – Program Service Areas.

Table 4. Program Service Areas

Service Area	Number of Academies*	Percentage
20 Miles or Less	12	34.3
20-50 Miles	14	40.0
Statewide	4	11.4
State and Beyond	2	5.7
Other (County, More Than 100 Miles)	3	8.6
TOTAL	**35**	**100.0**

* Number of classes reported does not include those four academies that were not in full operation.

PROGRAM COST ANALYSIS

Thirteen of the 39 DOD STARBASE academies were funded this year. Although funding was intended to provide the resources for new DOD STARBASES to start at the beginning of the program year, the new DOD STARBASE academies are in various stages of development and operation. Nine of the academies are fully staffed and serving students. The remaining four academies are in various stages of recruiting and processing staff. The staggered starts will result in these academies fulfilling a fraction of the performance requirement for DOD STARBASE during their first year.

The average cost per unit of the program has leveled off over the past four years with a slight increase in PY 2001 because of the number of new academy start-ups (i.e. 13 new academies). Budget allocations have remained relatively stable over eight years of operation and average about $245,000 per academy. During the first four years of operation (1994-1997), the cost per academy was slightly more than $260,000 while over the past four years (1998-2001), the cost averages to approximately $235,000 per academy. This represents a net decrease of $25,000 per academy, or a 9% percent decrease per academy. This year, the average cost per academy is $237,685.

1994-1996	1997-2001	%(+ -)
$262,224	$235,272	-9%

The average cost per student in the first seven years of operation (1994-2000) was $197 per student. This year, it averages to $246.60 per student. This increase is due to the staggered start-up of 13 new academies this year. Four of these academies processed zero students at the time of this report. The remaining academies have processed an average of 217 students per academy. See Figure 4 – Average Cost Per Student Per Year, Federal Funding.

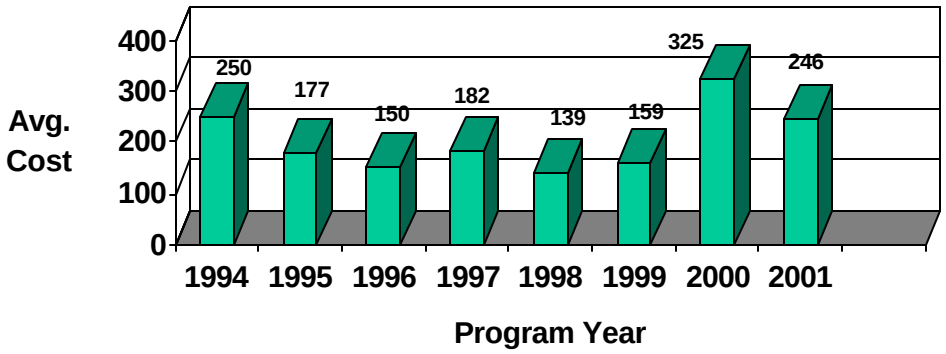


Figure 4. Average Cost Per Student Per Year, Federal Funding

The average cost per student over the life of the program is approximately $171.00. The cost per student in this reporting period is $246.60 based on DOD funding sources. Cost per class this year currently is $6,013.

The major source of funding for DOD STARBASE remains DOD. Less than $900,000 is obtained through outside sources such as grants, donations or trusts. This is less than 10% of the annual budget of the academies (9.6%). These funds are not consistent so are problematic from year to year as to amounts and commitment. They are generally used for new equipment, additional instructor assistance, or development of new curriculum.

As indicated in last year's report, there are differences in the annual budgets of each of the academies. In addition, there are differences in support services provided by the military bases and the communities. These differences result in variances in the quality of program operations and equipment and the sophistication of classroom presentations. However, there are offsets. Many of the academies share resources such as curriculum design and "lessons-learned," which results in leveling of the differences. Curriculum development, installation assistance, electronic delivery, and other techniques are being explored and developed to alleviate the problem.

Command Sponsorship

The National Guard remains the dominant sponsor of the program; however, the other service components are becoming more involved and interested in future sponsorship. Table 5, summarizes the allocation by service component.

Table 5. Component Allocation

Service Component	DOD Funds	Total Funds
National Guard	$6,518,000	$7,386,194
Marine Corps	$452,400	$452,400
Air Force	$717,000	$719,500
Navy	$1,820,000	$1,836,000
PROGRAM TOTALS	**$9,507,400**	**$10,394,094**

Military and Educational System Support

The difference in the military and educational system support varies with each academy in quality and amount. For the most part, the differences reflect the size and the availability of resources at the installation and the economic position of the target community.

Traditionally, the educational systems provide transportation services and teachers as monitors. A few provide classroom facilities. The military, on the other hand, provides classrooms, instructor-mentor support, volunteers as aids/tour guides, computer and Internet linkages, supplies, testing aides, audio-visual equipment, duplication equipment, and in some cases

maintenance, janitorial support, and the cost of utilities. Some installations provide remodeling of DOD STARBASE facilities. The range of services and support is often a function of size and command interest in the program. Overall, the military support is extensive and consistent. Almost every DOD STARBASE director praised the active and overwhelming support of the commander.

DOD STARBASE presents itself as a military outreach program that requires community and educational system participation. The curriculum, facilities, instructors, and expendable resources are DOD and military installation responsibilities. Student availability, transportation, and meals are provided by the educational system. Each command has discretion based on their willingness and ability to provide ongoing support services beyond classroom and maintenance services. In almost every case, the commanders have been generous with their time and resources.

Each program struggles with its budget. The priorities are on instructor salaries, materials, and equipment. Additional assistance the military provides beyond the basic support permits the DOD STARBASE director to use those resources to expand their materials development, provide additional assistance, and formulate other applications. Additional funds through grants and private sector donations provide expanded capability and enhance programming for a few of the academies. About a third of the academies have additional funds to expand their program. There are a few others who have obtained modest contributions that allow for additional help or enhanced programming. Additional sources of funds amounts to approximately $900,000 and is concentrated in a few academies. Most academies do not have additional sources of funds and work solely on DOD funding and military in-kind support.

DODI guidelines allow academies to seek supplemental funding. A few years back, DOD funding support was problematic, and the academies were encouraged to seek outside support to protect their programs. Several academies were quite successful in obtaining some funds through sponsors and grants; however, most of this money is not designated for ongoing operations but rather for specific tasks. Overall, most of the academies operate on small margins and are totally dependent on DOD funding. Only a few have the capability to obtain additional program enhancements. See Table 6 – DOD STARBASE Program Site Support.

Table 6. DOD STARBASE Program Site Support

Site Support Areas	Number of Sites Receiving School Support	Number of Sites Receiving Military Support	Comments
Classroom Space	0	29	
Transportation	33	12	
Lunch	31	0	
Teachers Monitors	32	0	
Trainers, Tours, Presentations	0	27	Tour guides and special presenters
Duplication	9	10	
Educational Supplies	3	0	
Teaching Aides	0	13	
Audio Visual	3	9	
Computer	4	7	
Communications	2	22	Telephones, email, mail, and traditional
Office Supplies	0	7	
Personnel	0	11	
Other	2	17	Procuring supplies, administering budgets, computer maintenance, and janitorial service.

RECOMMENDATIONS

This year's DOD STARBASE operation was characterized by a profound growth of the program to several new academies across the nation and an expansion of selected academies. As the program becomes more popular and accepted, the demand for further expansion is expected. While managing growth and demand requires attention, maintaining quality control is equally important. The issue of demand requires careful review and consideration since resources and funding are limited, and growth requires focus on effective uses of economies of scale, efficiencies, transportability of "lessons-learned," installation support, and more effective communication among the various operating components of the program.

Standardization, compliance, and assessment activities were also emphasized over this past year. Further refinements in these activities are required. While independent assessment and testing is essential in demonstrating and empirically documenting the achievement of program operations and development, they also have relevance in program utilization. Similarly, compliance and academy self-inspections help to maintain quality control and elements of standardization, which makes transportability, testing, and other activities possible. Self-inspections also provide each academy the ability to identify and develop corrective action to compliance issues prior to a formal academy compliance visit.

With the influx of several new academies into the program this year, several supportive services are needed to assist them in rapid and efficient installation of their programs. This will require a focus on core curriculum, educational materials, operational manuals, guidelines, and equipment requirements. It will also require the "lessons-learned" and practical experience of other DOD STARBASE academy personnel.

The following recommendations are made in response to the above:

- ✓ **Expand the Assessment Survey to Include an Examination of Academy Budget Management Allocations**

  Most programs expend the majority of their DOD allocation on salaries and benefits of its staff. Discretionary items are minimal and are usually focused on student supplies and instructor materials. There are several DOD STARBASE academies that manage other youth programs and some of the DOD STARBASE staff service those other programs. Most of those academies have expanded programs and additional funding sources. DOD STARBASE directors and administrative personnel are careful in separating their use of funds and documenting the allocations to the appropriate program. However, it is important to formalize the use of separate budgets and invoices, and document appropriately to allay potential concerns. No problems have emerged in this area, but care and attention to discrete budget management would limit any negative perceptions. The director's survey and self-audit with periodic compliance visits would help to highlight attention to this matter and allow each manager the opportunity to perform corrective action to put their reports in order.

✓ Implement an Academy Installation Program

Installation and orientation materials have been developed over the past year to assist new academies in starting their programs in a timely fashion. A director's guide on operational procedures, participant forms, policy and procedures, annual core curriculum and other educational tools are currently in place, along with orientation and training of new academy staff by OASD/RA. With the number of new academies and the potential additions in the future, this program would assist in the rapid installation and operation of the new academies. Enhancements and assistance from sister academies have been available in the past when schedules allowed. Procedures and schedules should be developed in the first quarter of the calendar year. Past assistance depended on sister academies and their availability, which involved visits to the new academy. This installation program would speed up the process and assure that all key elements are addressed in a time sensitive fashion. According to new DOD STARBASE directors that have experienced the orientation component of the implementation strategy, it is most effective when performed just after the staff is hired and before the first class.

✓ Review and Assess the Information and Communication Requirements of the DOD STARBASE Academies and the Support Service Groups

It became apparent through the academy visitations and the director's conference that many of the DOD STARBASE staff and the affiliate support groups require timely, reliable, and useful information on the requirements, guidelines, resource materials, and scheduling agendas among the various operating groups. An electronic bulletin board and resource center of DOD STARBASE materials, via the DOD STARBASE web site, will be developed and installed in the future to assist in this requirement. However, an inventory of the information requirements should be assessed prior to its development to maximize its use, application, and quality. Resource center materials currently available for download are core curriculum, operational manuals, director guides, and DODI guidelines.

Networking among academies and the national office is currently informal and, in many cases, partially effective for those academies that use that medium. However, there is a need for a more organized system with contact numbers, available expertise, and identifiable resources.

✓ Continue the Use of the DOD STARBASE Directors Conference and Expand the Agenda

The director's conference that was conducted in December 2001 reinforced the view that there are a number of common issues, concerns, and points of program policy/procedure clarifications that would benefit from a collective review and refinement by DOD STARBASE leadership. In addition, the conference was particularly useful to the new directors who were seeking to share, borrow, and build professional networking relationships.

Because of the rapid growth of the program and the variances between academies in their program maturity, differences in program operations and expectations emerge. A forum that allows STARBASE leaders to discuss their collective concerns in an environment that has all the resources and expertise in one assembly has the potential to clarify and resolve existing and potential problems.

Program requirements, new initiatives, and administrative and assessment procedures can be viewed in common by the attendees. Academy directors have a stake in the future development and planning of the national program. Their roles, concerns, and input into that process are essential. In addition, periodic review and assessment of the program's basic objectives, initiatives and practices need revisiting and adjustment. The input and observations of the directors in that process could prove useful.

✓ Operationalize the Resource Center to all Academies

The overall design and initial development of the centralized resource center has been realized. DOD " STARBASE In a Box" and other manuals are currently available for downloading. Assessment surveys and other materials are currently being installed but need refinement and control features. Assessment of the center's usefulness and effectiveness should be part of the next assessment program.

✓ Other Recommended Actions

Attention to staff turnovers and retention should continue and be documented. This year, the program had minimal turnover problems, but several directors indicated that they anticipated problems in the near future. They indicate that lack of cost-of-living allowances, minimal salary administration capability, and competing systems are potential areas of concern.

The documentation of the program and the attention to prior recommendations have proved fruitful in producing and focusing the energies of DOD STARBASE personnel and its support groups. New challenges in quality control and growth are emerging as future concerns. However, the energy and commitment of the DOD STARBASE staff will probably meet these challenges successfully as they have met them in the past.

CONCLUSIONS

After eight years of operation under DOD sponsorship, DOD STARBASE has grown into national prominence and acceptance in the communities it serves. The 39 funded academies are located in 26 states, Puerto Rico, and the District Columbia. There are a number of additional states requesting entry into the program, and several operating programs have requested support for expansion. While demand remains intense for new and expanded installations, attention over this past year focused on obtaining quality control, standardization in core curriculum and operations, empirical documentation of the program's ability to reach stated objectives, efficiencies in operation, and resource sharing. To obtain these objectives across all program academies, DOD issued a series of regulatory and compliance guidelines to the operating academies in the early part of program year 2001. Many of these operational and administrative considerations were already in place prior to this issuance, but the new regulations formalized the guidelines and provided procedures for exceptions as deemed necessary. Academy audits were conducted to monitor compliance and enforce accountability to the regulations. The audits revealed that the DODI guidelines were less intrusive than expected and most academies were in compliance. Only a few required minor corrective action. One academy required more extensive revision in curriculum and delivery considerations. The compliance process will continue into next year with the goal of obtaining full compliance across all academies.

Core curriculum, testing, installation packages, networking, communication, and cost control were activities that were enhanced this past year. Attention to these activities will continue into next year's effort. Because of the DOD STARBASE program, commanders enjoy positive responses from community leaders, teachers, and parents.

Direct installation support from DOD will be forthcoming next year to obtain rapid start-up of the new programs and economies of scale in installation costs. Local autonomy and diversity continues to compete for program time with the core curriculum requirements, operating imperatives, and assessments. The amount of material and activity that is introduced into the program in the short time available with students makes it difficult to introduce too many new elements. DOD STARBASE personnel are working on the issue. The majority of program recommendations for next year focus on building support systems, building more effective communications among the DOD STARBASE units, and obtaining economies of scale in the operation.

Beyond the expansion of the DOD STARBASE program to more than a dozen additional academies, several new initiatives were introduced in last year's program. The DODI was issued to focus the program on several key standardization issues in core curriculum, base operations, testing and assessment procedures, reporting requirements, and lessons-learned for transportability, and installation from program to program. While the program's growth focused on adding new academy locations, there was also an expansion of existing academies. A start has been made in developing a centralized resource center. Core curriculum, operational manuals, participant agreements, and other operational tools will be made available to new academies as well as current operating academies through this medium. These materials will be packaged in a centralized installation program that will be delivered to new academies.

Developing a standardized testing system on a national level during this period of growth presents a key challenge in methodology and is an important part of the assessment process. The test focuses on the core curriculum and student performance in the knowledge and skill areas of math and science. Preliminary testing and item construction has been completed. A program-wide testing program will be installed in this coming year. In the interim, several other assessment procedures remain in operation.

Obtaining basic modalities in operational procedures is critical in future planning and distribution of resources. The attention of the compliance imperatives on such matters as class hours, basic curriculum, testing, size of classes, delivery systems on military installations and so forth is vital in making resource allocations from the DOD to each academy more equitable and rational.

Managing rapid growth while maintaining quality control are key concerns for DOD STARBASE in this phase of its development.

GLOSSARY

Adjusted Data: Data that is derived from the same academies that was operating last year so that comparisons can be made concerning the internal growth of the program.

Alternative Education Provider: A public or private school that is designed for children who do not function well in the traditional school setting. This may include continuation high schools or schools that fall outside the categories of regular, special education, or vocational education.

At-Risk Youth: Students at risk are those who have characteristics that increase their chances of dropping out or falling behind in school. These characteristics may include being from a single parent household, having an older sibling who dropped out of high school, changing schools two or more times other than the normal progression (e.g., from elementary to middle school), having C's or lower grades, being from a low socio-economic status family, or repeating an earlier grade.

Class: Within the context of a DOD STARBASE academy, a class is a grouping of students. This group may not necessarily have been a homogenous entity prior to DOD STARBASE instruction; it may be a temporary grouping only for the purposes of assembling for the 20-hour minimum period of DOD STARBASE instruction.

Classroom Contact Hour: A period of 60 minutes, plus or minus five minutes, in which a DOD STARBASE Academy instructor is actively involved with students or in which a military member is demonstrating, displaying, or teaching an application of math, science, or technology to the students.

Disability: Physical, mental, or sensory impairments that render major life activities more difficult.

DOD Components: Those Department of Defense entities that have established or are in pursuit of establishing a DOD STARBASE academy, including the military departments, defense agencies, and defense field activities.

DOD Instruction: Document that implements policies, responsibilities, and procedures for executing the DOD STARBASE program.

Inner City Location: Central section of a city, which is usually older and more densely populated.

Non-Profit Organization: A legal entity recognized or chartered by competent state authority and to which the Internal Revenue Service has given status as a 501c(3) tax-exempt educational organization.

Operational Academies: An academy that is processing students.

Program Year: Period of time defined by local school year.

Rural Location (as defined by the U.S. Bureau of Census): The population and territory outside any urbanized area and the urban part of any place with a decennial census population of 2,500 or more.

Site: See STARBASE Academy

Socio-Economic Disadvantage: Used for economically deprived, poor, poverty stricken, or disadvantaged individuals or groups.

STARBASE Academy: A DOD educational entity that seeks to improve the knowledge and skills of students in kindergarten through 12th grade in mathematics, science, and technology, and follows the academy model described in DoDI 1025.7. A DOD STARBASE academy is not defined in terms of a geographic location.

DOD STARBASE Core Curriculum: The fixed course of study referenced in the DODI that must be taught by all DOD STARBASE academies.

DOD STARBASE Program: The DOD STARBASE Program is authorized by Title 10 U.S.C. section 2193b as a DOD science, math, and technology education improvement program. The Office of the Assistant Secretary of Defense for Reserve Affairs administers policy and oversight; the DOD Components execute the program at DOD STARBASE academies. DOD STARBASE is funded by Congress as a Civil Military Program.

DOD STARBASE Site: The component of a DOD STARBASE academy that performs instruction. Academies can be co-located at a DOD STARBASE academy or geographically separated from the academy.

State: The 50 states of the United States of America, District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, and Guam.

Appendix A

Selected DOD STARBASE Program Data Tables

- ✓ Supplemental Programs
- ✓ Number of School Participating in Program
- ✓ Rank Ordered Attitudes
- ✓ 2001 Assessment Data – Percent Correct Scores for Questions 1 – 33
- ✓ 2001 Assessment Data – Mean Scores for Attitude Items 1-25

Supplemental Programs

ID	State/City	Summer School	One Day Workshop	Community Outreach	Teachers Training	Other
1	Alaska					
2	California, San Diego	●		●		After School Rocketry for Schools
	California, Sacramento			●	●	Summer Science and Math Camps
4	Connecticut					
5	DC					
6	Florida, Jacksonville	●				
7	Florida, Pensacola	●	●	●	●	Home School
8	Florida, Whiting Field	●	●	●	●	
9	Georgia, Robins	●		●		
10	Georgia, Atlanta					
11	Hawaii					
12	Iowa, Johnston	●	●		●	
13	Kansas, Topeka	●	●		●	
14	Kansas, Wichita	●	●		●	
15	Louisiana, Barksdale	●	●	●	●	3-Hour Course for the National
16	Louisiana, New Orleans	●	●	●	●	Mini Sessions for Youth at Risk
17	Maine	●	●	●	●	Administrator's Academy
18	Michigan, Selfridge	●	●	●	●	
19	Michigan, Detroit	●	●	●	●	
20	Minnesota	●	●		●	Special Programs for Children Guard
21	Mississippi, Gulfport	●	●	●	●	Educational Specialist Training
22	North Carolina, Charlotte	●				
23	Oklahoma, Tulsa					
24	Oklahoma, Oklahoma City					
25	Oregon, Klamath	●	●	●	●	
26	Oregon, Portland	●	●	●	●	
27	Pennsylvania, Boswell	●	●	●	●	Overnight Science Camp in the Summer
28	Puerto Rico	●	●		●	
29	South Carolina, Beaufort	●	●	●		
30	South Carolina, Columbia					
31	South Dakota	●	●		●	
32	Texas, Houston	●	●	●	●	
33	Texas, San Antonio	●				
34	Vermont, South Burlington	●		●	●	
35	Vermont, Rutland	●		●	●	
36	Virginia, Norfolk	●	●		●	Principal's Workshop
37	West Virginia	●	●	●		
38	Washington, Silver Dale	●				Summer School Session
39	Wyoming, Cheyenne				●	
TOTAL SUM		**28**	**21**	**19**	**23**	

Number of Schools Participating in Program

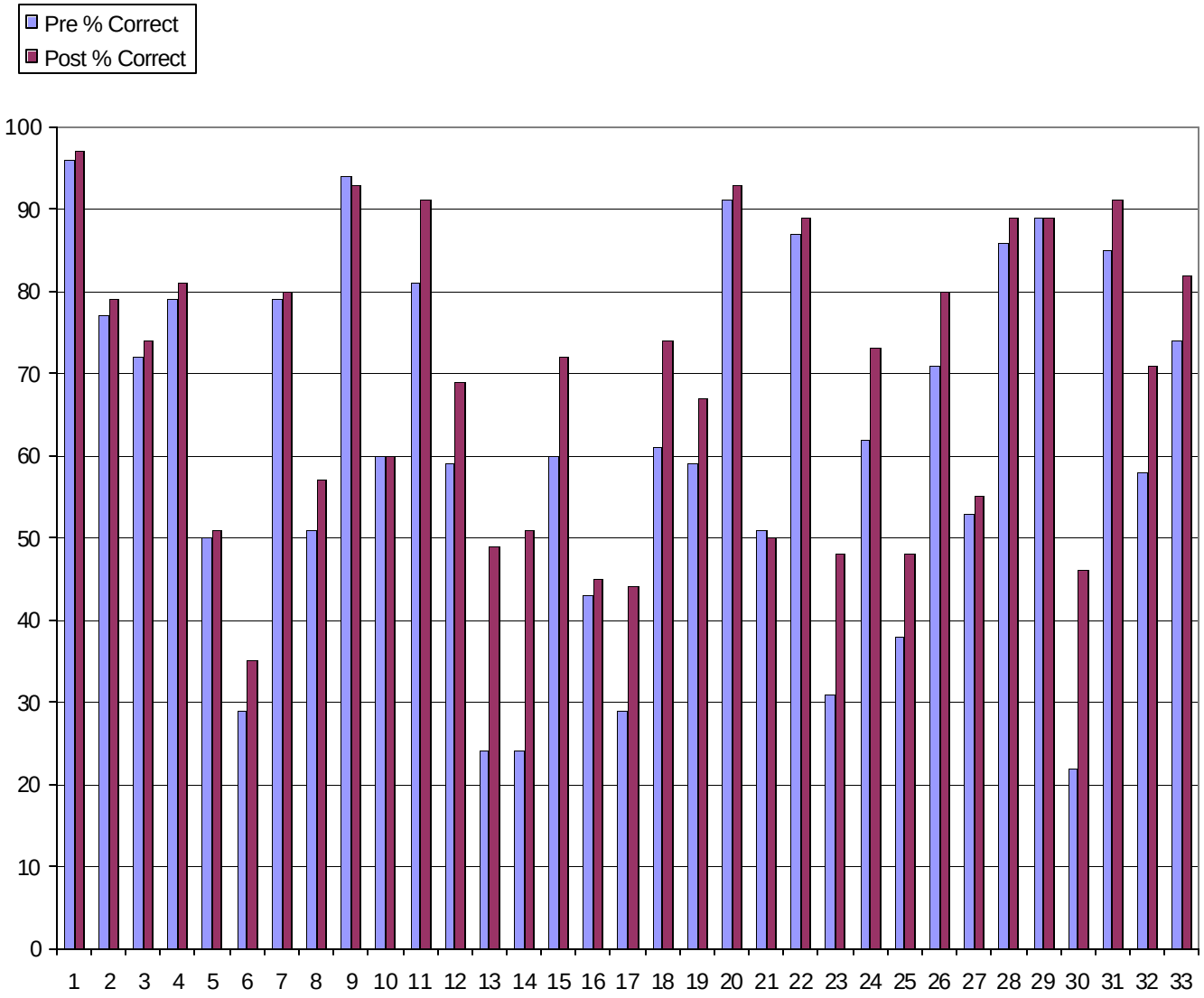
ID	State/City	Completed	Projected
1	**Alaska**	0	5
2	**California, San Diego**	9	4
3	**California, Sacramento**	53	39
4	**Connecticut**	0	9
5	**DC**	0	0
6	**Florida, Jacksonville**	5	2
7	**Florida, Pensacola**	12	3
8	**Florida, Whiting Field**	14	3
9	**Georgia, Robins**	21	15
10	**Georgia, Atlanta**	2	0
11	**Hawaii**	0	0
12	**Iowa, Johnston**	330	15
13	**Kansas, Topeka**	16	8
14	**Kansas, Wichita**	20	12
15	**Louisiana, Barksdale**	10	4
16	**Louisiana, New Orleans**	48	9
17	**Maine**	0	0
18	**Michigan, Selfridge**	18	6
19	**Michigan, Detroit**	18	8
20	**Minnesota**	24	9
21	**Mississippi, Gulfport**	2	3
22	**North Carolina, Charlotte**	24	10
23	**Oklahoma, Tulsa**	15	4
24	**Oklahoma, Oklahoma City**	6	2
25	**Oklahoma State**	66	22
26	**Oregon, Klamath**	21	4
27	**Oregon, Portland**	11	2
28	**Pennsylvania, Boswell**	7	2
29	**Puerto Rico**	18	0
30	**South Carolina, Beaufort**	14	4
31	**South Carolina, Columbia**	1	4
32	**South Dakota**	8	5
33	**Texas, Houston**	24	6
34	**Texas, San Antonio**	14	6
35	**Vermont, South Burlington**	152	9
36	**Vermont, Rutland**	0	0
37	**Virginia, Norfolk**	17	4
38	**West Virginia**	3	4
39	**Washington, Silver Dale**	2	4
40	**Wyoming, Cheyenne**	17	10
TOTAL SUM		**1022**	**256**
TOTAL AVG		**26**	**6**

Teachers rated the STARBASE experience positively for themselves, their students, and their students' families. The teachers find the STARBASE experience useful beyond the STARBASE program and use the materials in their curriculum. They also notice improvements in their students' attitudes about school and themselves.

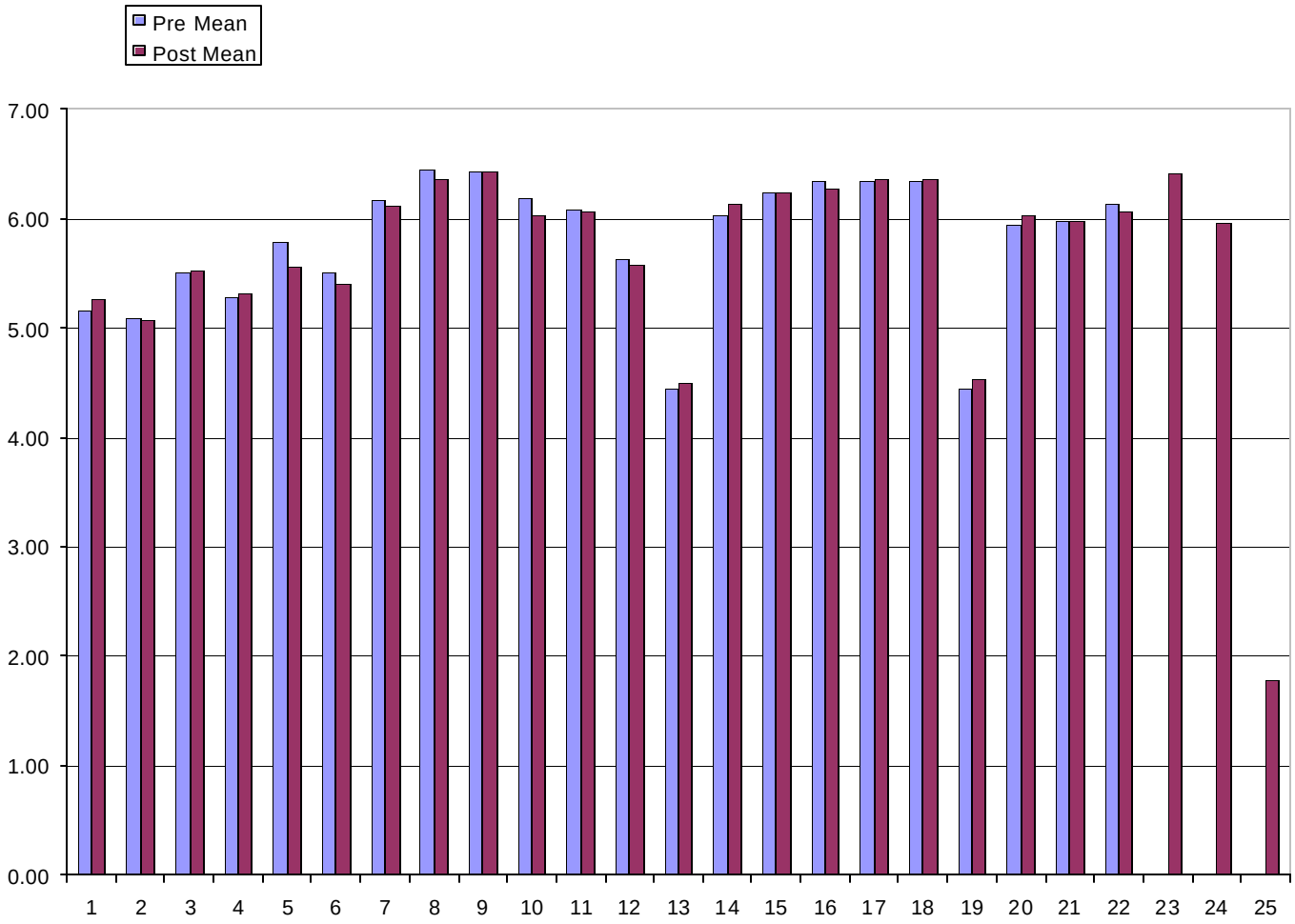
Rank Ordered Attitudes

	Mean	Std. Deviation
The children enjoy sharing their STARBASE experiences with others	6.81	.59
STARBASE reinforces many positive behaviors I try to teach my students	6.81	.49
The STARBASE instructors are good role models for the students	6.77	.61
The STARBASE curriculum supports our state standards	6.76	.55
The students talk about STARBASE long after the program has ended	6.73	.63
Parents are delighted that their children are participating in STARBASE	6.72	.69
STARBASE has helped improve the students understanding of science	6.66	.55
More interested in learning about science	6.64	.62
I would like more STARBASE resources to take back to my classroom	6.58	.89
The students admire their STARBASE instructors	6.57	.93
The students enjoyed being on a military base	6.50	.86
I use the resources STARBASE provides to teachers	6.47	.87
My principal is a strong advocate of STARBASE	6.45	1.24
More excited about learning	6.27	.88
More willing to try new things	6.24	.74
More confident about what they can accomplish	6.18	.88
STARBASE has helped improve the climate for participative learning in the classroom	6.11	.97
More comfortable with military personnel	6.10	1.03
STARBASE has helped to improve appreciation of how math can be applied to a variety of situations	6.06	1.08
More willing to cooperate with each other	6.05	1.03
Because of my participation in STARBASE, I am more comfortable with military personnel	6.04	1.28
Better at working in groups	6.02	.97
More excited about their futures	6.00	.96
I have included many STARBASE resources in my curriculum	5.98	1.23
More likely to encourage each other	5.93	1.09
My school board is very involved in supporting STARBASE	5.75	1.47
The students ask more questions about technology	5.74	1.39
More interested in learning about math	5.70	1.13
More goal oriented	5.66	1.10
More comfortable making decisions	5.64	1.09
Better at following directions	5.50	1.25

2001 Assessment Data – Percent Correct Scores for Questions 1-33



2001 Assessment Data - Mean Scores for Attitude Items 1-25



Appendix B

Survey Instruments

- ✓ DOD STARBASE Teacher's Survey
- ✓ DOD STARBASE Student Pre/Post-Flight Knowledge Questionnaire

Please indicate your level of agreement with these statements.

		Disagree						Agree
1.	After STARBASE, the students ask more questions about technology.	①	②	③	④	⑤	⑥	⑦
2.	STARBASE has helped to improve the students' understanding of science.	①	②	③	④	⑤	⑥	⑦
3.	STARBASE has helped to improve appreciation of how math can be applied to a variety of situations.	①	②	③	④	⑤	⑥	⑦
4.	STARBASE has helped to improve the climate for participative learning in the classroom.	①	②	③	④	⑤	⑥	⑦
5.	Because of my participation in STARBASE, I am more comfortable with military personnel.	①	②	③	④	⑤	⑥	⑦
6.	The students talk about STARBASE long after the program has ended.	①	②	③	④	⑤	⑥	⑦
7.	STARBASE reinforces many positive behaviors I try to teach my students.	①	②	③	④	⑤	⑥	⑦
8.	I use the resources STARBASE provides to teachers.	①	②	③	④	⑤	⑥	⑦
9.	I would like more STARBASE resources to take back to my classroom.	①	②	③	④	⑤	⑥	⑦
10.	My principal is a strong advocate of STARBASE.	①	②	③	④	⑤	⑥	⑦
11.	My School Board is very involved in supporting STARBASE.	①	②	③	④	⑤	⑥	⑦
12.	The STARBASE Instructors are good role models for the students.	①	②	③	④	⑤	⑥	⑦
13.	I have included many STARBASE resources in my curriculum.	①	②	③	④	⑤	⑥	⑦
14.	The students admire their STARBASE Instructors.	①	②	③	④	⑤	⑥	⑦
15.	The STARBASE curriculum supports our state standards.	①	②	③	④	⑤	⑥	⑦
16.	The children enjoy sharing their STARBASE experiences with others.	①	②	③	④	⑤	⑥	⑦
17.	Parents are delighted that their children are participating in STARBASE.	①	②	③	④	⑤	⑥	⑦
18.	The students enjoyed being on a military base.	①	②	③	④	⑤	⑥	⑦

Thank you!

Please mail to: **Survey Unit – STARBASE**
Reid London House
One North Dearborn
Chicago, IL 60602-4431

Assessments 10/01 MW241126-1 654321

Pre-Flight and Post-Flight Questionairre

PHONE NUMBER

I am in grade: 1 2 3 4 5 6 7 8 9

I am age: 0 0 1 1 2 3 4 5 6 7 8 9

I am a: ○ Boy ○ Girl

I have met military people before coming to STARBASE. N No Y Yes

I know someone that went through STARBASE before. N No Y Yes

For each statement, fill in True if you agree or fill in False if you disagree.

True	False		
T	F	1.	A team works together to achieve a common goal.
T	F	2.	Alcohol impairment is the affect alcohol has on our body as it decreases its ability to function properly.
T	F	3.	Matter can exist in a vacuum.
T	F	4.	An atom is the joining of two or more molecules.
T	F	5.	Matter can change between liquid, solid, and gas states.
T	F	6.	The Earth is the closest planet to the sun.
T	F	7.	Negative actions take you further from your goal.
T	F	8.	Technology usually increases the size of something.

9. Using teamwork results in ....
   - A sharing of work among the team.
   - B one person doing all of the work.
   - C a lot of wasted effort by team members.
   - D poor quality of work being done.

10. Which of the following is NOT a team.
   - A Fire Department
   - B Police Force
   - C McDonald's employees
   - D Wal-Mart customers

11. Which of the following is NOT one of the three states of matter?
   - A air
   - B gas
   - C liquid
   - D solid

Wait for your instructor to read the directions and questions.

PLEASE DO NOT WRITE IN THIS AREA

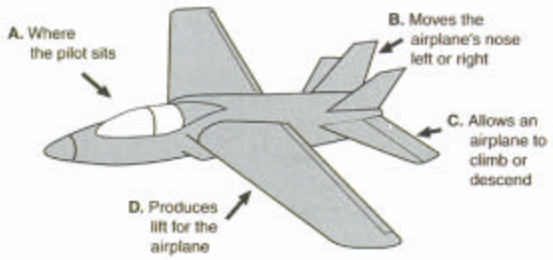
SERIAL

12. How thick is the earth's air?
    - Ⓐ 10 miles
    - Ⓑ 50 miles
    - Ⓒ 100 miles
    - Ⓓ 200 miles

13. Air presses down 15 pounds on every inch of our bodies. The reason we don't feel this pressure is
    - Ⓐ The atmosphere cushions the weight of the air.
    - Ⓑ Our bodies push out 15 pounds on every inch to equalize the pressure.
    - Ⓒ We are inside a building, so we don't feel it.
    - Ⓓ The air is thinner closer to the ground than up in space.

14. The air is composed mostly of what element?
    - Ⓐ hydrogen
    - Ⓑ helium
    - Ⓒ chlorine
    - Ⓓ nitrogen

Match each airplane component with the letters from the diagram below.



A B C D
- Ⓐ Ⓑ Ⓒ Ⓓ **15.** Cockpit
- Ⓐ Ⓑ Ⓒ Ⓓ **16.** Wing
- Ⓐ Ⓑ Ⓒ Ⓓ **17.** Elevator
- Ⓐ Ⓑ Ⓒ Ⓓ **18.** Rudder

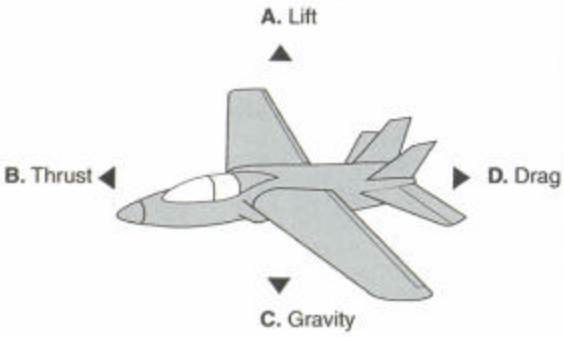
Select the best answer by filling in the appropriate circle.

19. If you are landing an airplane in a city that is 5,000 feet above sea level what will your altimeter read when you are on the ground?
    - Ⓐ 0 feet
    - Ⓑ 500 feet
    - Ⓒ 5,000 feet
    - Ⓓ 1,000 feet

20. If you want to move an airplane's nose to the left what do you do?
    - Ⓐ move the rudder right
    - Ⓑ move the rudder left
    - Ⓒ move the left flap
    - Ⓓ move the right flap

21. When you increase the speed of the air moving over a wing, the air pressure on that wing
    - Ⓐ increases.
    - Ⓑ decreases.
    - Ⓒ stays the same.
    - Ⓓ disappears.

Match each force of flight with the letters from the picture below.



A B C D
- Ⓐ Ⓑ Ⓒ Ⓓ **22.** Produced by air flow over the wings and the angle of the wing into the wind.
- Ⓐ Ⓑ Ⓒ Ⓓ **23.** Force that pulls an aircraft down.
- Ⓐ Ⓑ Ⓒ Ⓓ **24.** Forward movement produced by a propeller, jet, or rocket engine.
- Ⓐ Ⓑ Ⓒ Ⓓ **25.** Slows the forward movement of an aircraft.

26. What is Sir Isaac Newton's Law of Inertia?
    - Ⓐ Unless acted upon by outside force, an object at rest will stay at rest and an object in motion will stay in motion.
    - Ⓑ The more force given to an object, the more it will accelerate.
    - Ⓒ The greater the mass of the object, the greater the force needed to accelerate it.
    - Ⓓ For every action, there is an equal and opposite reaction.

Wait for your instructor to read the directions and questions.

27. If you threw two balls of different weight using the same amount of force
    - (A) The heavier ball would go the farthest.
    - (B) The lighter ball would go the farthest.
    - (C) The two balls would go the same distance.
    - (D) The heavier ball would go twice as far as the lighter ball.

28. Our Solar System consists of how many planets?
    - (A) 4
    - (B) 6
    - (C) 7
    - (D) 9

29. The component of the space transportation system (STS) that provides the thrust against Earth's gravity to lift the STS is what?
    - (A) external tank
    - (B) orbiter vehicle
    - (C) solid rocket booster
    - (D) insulation tiles

30. Which planet is the smallest of all planets and the farthest away from the sun?
    - (A) Mercury
    - (B) Pluto
    - (C) Saturn
    - (D) Earth

31. The development or introduction of something new, or the alteration and improvement of something already existing is
    - (A) gravity.
    - (B) technology.
    - (C) inertia.
    - (D) law.

32. If you have something you want to do, or something you want to be in life, you should
    - (A) wish for it really hard in order to make it come true.
    - (B) watch other people on TV to see how they do it.
    - (C) do something everyday that will help you reach your goal.
    - (D) wait for someone to give you what you want.

33. Which of the following can destroy an individual's dreams?
    - (A) setting goals
    - (B) using illegal drugs
    - (C) obtaining an education
    - (D) practicing a skill

What is your opinion?

		 Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	(?) Uncertain (4)	Slightly Agree (5)	Agree (6)	 Strongly Agree (7)
1.	I like math.	1	2	3	4	5	6	7
2.	I am good at math.	1	2	3	4	5	6	7
3.	I like science.	1	2	3	4	5	6	7
4.	I am good at science.	1	2	3	4	5	6	7
5.	I am good at following directions.	1	2	3	4	5	6	7
6.	Learning is easy for me.	1	2	3	4	5	6	7
7.	Learning can be fun.	1	2	3	4	5	6	7
8.	You can learn a lot by trying things out.	1	2	3	4	5	6	7
9.	I think I can graduate from High School.	1	2	3	4	5	6	7
10.	Military people do lots of different things.	1	2	3	4	5	6	7
11.	I set goals for myself.	1	2	3	4	5	6	7
12.	I make good decisions.	1	2	3	4	5	6	7
13.	I think I could grow up to be a STARBASE Instructor.	1	2	3	4	5	6	7
14.	I can make my dreams come true.	1	2	3	4	5	6	7
15.	You can accomplish a lot in a group.	1	2	3	4	5	6	7

Wait for your instructor to read the directions and questions.

What is your opinion?

		Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	(?) Uncertain (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
16.	You can have fun working in a group.	①	②	③	④	⑤	⑥	⑦
17.	I like to make new things.	①	②	③	④	⑤	⑥	⑦
18.	I think about what I want to be when I grow up.	①	②	③	④	⑤	⑥	⑦
19.	I want to be like my STARBASE Instructor.	①	②	③	④	⑤	⑥	⑦
20.	I am enjoying coming to a military base.	①	②	③	④	⑤	⑥	⑦
21.	Military bases are cool.	①	②	③	④	⑤	⑥	⑦
22.	I like to think of new ways to use things.	①	②	③	④	⑤	⑥	⑦
Post	At STARBASE, I learned a lot of things that I can use.	①	②	③	④	⑤	⑥	⑦
Post	I would tell my friends to come to STARBASE.	①	②	③	④	⑤	⑥	⑦
Post	STARBASE is boring.	①	②	③	④	⑤	⑥	⑦

Thank You!